

High hopes, red tides

A 'red tide' or Harmful Algal Bloom killed fish along the north coast of Kenya and southern Somalia in the last week of January 2002

The World Wide Fund for Nature (WWF) has been managing the Kiunga Marine National Reserve (KMNR) with the Kenya Wildlife Service (KWS) since 1996, and was extremely concerned when reports of dead fish began coming in on Friday, 25 January. WWF staff investigated and confirmed the reports, observing so many dead fish that fisherman were having difficulty steering their boats through them. Reef fish and moray eels had died in huge numbers, and pelagic species and turtles were also affected. Local fishermen were shocked and confused, and wondered why Allah was punishing them.

The same thing was happening along the southern Somali coast. Rumours about Americans poisoning the water, and Somalia testing biological weapons spread through the artisanal fishing communities in northern Kenya. US forces were conducting pre-planned exercises in the area, but had neglected to inform local villages, adding to their suspicions.

The KMNR is a remote and isolated area, north of Lamu Island and just south of the Somali border. It has been a marine protected area since 1979, and was designated a UN Biosphere Reserve (with the nearby Dodori National Reserve) in 1980. The 11,000 Bajun and Boni people living in, and adjacent to, the reserve, fish the local waters for subsistence and trade. They make a living from selling reef finfish, lobsters, shark and sea cucumbers to dealers from Lamu, Malindi and Mombasa, for hotels in Kenya and for international markets.

Fishing licences are obtained from the District Fisheries office in Lamu, or other ports along the coast. There are no restrictions on the area that can be fished or the gear that can be used, so anyone can

fish in the reserve. Commercial trawlers are supposed to stay at least 5 nautical miles out, but often claim they have authorization to fish inshore. With limited resources, it is difficult for the District Fisheries to challenge this, and restrict local resources to local fishers.

The Bajun people are of mixed Swahili, Arab and Bantu ancestry, and live along the shores of northern Kenya and southern Somalia. During the northeast monsoon (November to March), their main economic activity is fishing, though many turn to subsistence farming (slash-and-burn) or animal husbandry during the rougher conditions of the southeast monsoon. Mangrove harvesting, and collection of lobsters, sea cucumbers, and cowries continues throughout the year.

As stocks are depleted elsewhere in Kenya, there is increasing pressure on the reserve to meet local and international demand. The 'old ways' have been discarded in favour of more fashionable gill-netting, beach- and purse-seining techniques with nylon nets (many with undersize mesh that fishers cannot afford to replace). Yet traditional fish trapping methods using *uzio* funnels, *madema* traps and nets woven from *doum* palm leaves have proved more efficient, and are less destructive to the reefs and seagrass beds.

Subsistence purposes

The Bajuns use the *kimia* method to catch lobsters—young men skin dive at low tide to spear octopus, using them to scare lobsters out of their holes. The majority of fishers work as teams, but spear-fishing and hand-lining are also practised by individuals, mainly for subsistence purposes. Naturally, when local fishermen began to observe fish dying in large numbers, they feared for their

livelihoods. Within a week of the first reports, despite protests from local fishermen, the District Fisheries office banned fishing until the reason for the deaths could be established. Dealers from Lamu and Malindi tried to bypass the area and buy fish from Somalia instead.

Meanwhile, WWF/KWS, the Fisheries Department and Kenya Marine and Fisheries Research Institute had collected water and tissue samples to send to Nairobi, Mombasa and South Africa for analysis. A red tide was suspected due to discolouration of the water, but conditions were unusual. HAB (Harmful Algal Bloom) usually occurs when water is warm and calm, but the weather had been windy, the sea rough, and no rise in sea temperature was observed. Indeed, some fishermen had commented on the water feeling cold. This may have been caused by upwelling. For most of the year, the KMNR area experiences a northerly current. However, during the northeast monsoon, the Somali Current reverses and flows south, colliding with the northerly East African Coastal Current. The point of the convergence is variable, but the upwellings generated off the KMNR are what make the area ecologically unique in Kenya—and create rich fishing grounds.

For the first few days, many thousands of fish died in the north of the reserve near

Kiunga, and then hundreds more in southerly areas like Kiwaiyu and Mkokoni a few days later. Much smaller numbers were later reported from Pate, Lamu and Manda islands, but the majority of deaths occurred within a week.

However, no more dead fish does not equate to no red tide. Harmful algae can kill marine creatures very quickly at their highest concentration. When the tide begins to diminish, the toxins continue to accumulate in filter feeders such as shellfish, reaching high enough concentrations to pose a serious health risk to humans, and remaining in the food chain for some time after the red tide disperses.

Unfortunately, there is no way to tell contaminated fish/shellfish from unaffected ones without laboratory tests. Red tide algae produce neurotoxins, which attack the nervous system, and are among the most potent known to man. Symptoms of eating contaminated shellfish may include tingling sensations, nausea, dizziness, diarrhoea, and in severe cases can lead to respiratory failure, paralysis and even death.

Health workers

There are no doctors and only five qualified nurses, five health workers and five dispensaries for the 11,000 people living in and adjacent to the KMNR; so it is

fortunate that shellfish is not part of the local diet. However, it is very popular with tourists, and local hoteliers and people with holidays booked in Kenya were eager for more information. Fish and crustaceans rarely accumulate enough toxin to cause major health problems, but until lab results were received, fishers and consumers were advised not to take any risks.

It was more than two weeks after the initial reports, that we got some results. Dr Grant Pitcher at the University of Western Cape in South Africa, an expert in red tide events, had identified in the water samples the *Gymnodinium* species (a dinoflagellate phytoplankton), which is a recognized fish killer. Fish kills are not a new occurrence in the western Indian Ocean, and marine scientists and managers from Zanzibar, Réunion and the Shimoni area of Kenya have recorded several fish and crustacean kills in the last few years. Most of these have been associated with very high dissolved oxygen concentrations in the water rather than red tides.

The real concern is the impact on the marine environment and the local fishing communities it supports. The ban on fishing was lifted on 11 February, but shellfish will be off limits for some time. No compensation or assistance has been offered, and the media interest generated may deter consumers from buying local seafood and tourists from coming to the area in the future. Local tourism has been limited by isolation and security problems (armed Somali bandits roaming inland) and has been low-impact environmentally. Hotels have contributed to both employment and education (donating to local primary schools, for example), as well as providing an additional market for fish and other seafood. The long-term damage to the economy and ecology is impossible to predict. The fishing ban was imposed by the Kenya Fisheries Department, but local fishers are suspicious of WWF's role in handling the crisis, and some believe it was a ploy to turn the reserve into a marine park and ban utilization of natural resources. This has never been the intention. The reserve objective is to conserve the terrestrial, coastal and marine habitats, flora and fauna of the

KMNR area and maintain their productivity in a manner that sustains both local livelihoods and the national economy in the long term. Local people are supportive of measures to ensure the long-term sustainability of their livelihoods, but the red tide has dashed some of their high hopes.

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